IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the application of:
Jonathan Meigs, et al.

Docket: 30-4590 (4950)

Serial Number: 09/361,458

Group Art Unit: 2832

Filed: July 27, 1999

Examiner: Karl Easthom

For: COMPOSITION AND METHOD FOR MANUFACTURING INTEGRAL RESISTORS IN PRINTED CIRCUIT BOARDS

APPEAL BRIEF FOR APPELLANT

Commissioner for Patents
Washington, D.C. 20231

Sir:

This is an Appeal to the Board of Patent Appeals and Interferences from the Final Rejection of claims 1-11 and 21-29 mailed April 4, 2002 in the above identified case. A Notice of Appeal was filed on September 4, 2002. An oral hearing is not requested.

This Brief is hereby filed in triplicate. A credit card authorization in the amount of $320.00 is enclosed. The Commissioner is authorized to charge any additional fees which may be required by this paper, or credit any overpayment, to Deposit Account No. 18-1589.

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I. REAL PARTY IN INTEREST

The real party in interest is Oak-Mitsui, Inc.

II. RELATED APPEALS AND INTERFERENCES

With respect to other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, please note that there are no other related applications on appeal or subject to an interference known to appellant, appellant's legal representative or the assignee.

III. STATUS OF CLAIMS

The claims in the application are 1-11 and 21-29, all of which are pending, stand rejected and are on appeal. No claims are allowed.

IV. STATUS OF AMENDMENTS

No amendment of the claims was filed after final rejection. A response in which the claims were not amended was filed after final rejection but refused entry by the Examiner.

V. SUMMARY OF THE INVENTION

The invention claims an electrically resistive composite material consisting essentially of an *electrically conductive material* selected from the group consisting of antimony, arsenic, bismuth, cobalt, tungsten, manganese, lead, zinc, palladium, phosphorus, sulfur, carbon, tantalum, aluminum, iron, titanium, platinum, tin, nickel, silver, copper and combinations thereof, and *an electrically non-conductive particulate material* selected from the group consisting of silicon carbide, alumina, platinum oxide, tantalum nitride, talc, polyethylene tetrafluoroethylene, and mixtures thereof evenly dispersed throughout the conductive material. The electrically resistive composite material is formed by codepositing the electrically non-conductive particulate material and the electrically conductive material onto a substrate by electrodeposition.

The invention also provides a multi-layer foil comprising a copper metal layer having a shiny surface, and an electrically resistive composite material layer associated with the copper metal layer shiny surface wherein the electrically resistive composite material layer includes from about 0.01 to about 99.9 area % of a conductive metal other than copper and from about 0.01 to about 99.9 area % of particles of alumina. The multi-layer foil is formed by codepositing the electrically non-conductive particulate material and the electrically conductive material onto the copper metal layer by electrodeposition. The electrically resistive composite material is useful in manufacturing printed circuit boards and other electronic substrates that include integral resistors.

VI. ISSUES

(a) Whether claims 1-11and 21-29 are unpatentable under 35 U.S.C. 102 over Hunt et al.

(b) Whether claims 1-5, 21-23, and 27 are unpatentable under 35 U.S.C. 102 over Van Den Broek et al.

(c) Whether claims 6-11, 24-26, and 29 are unpatentable under 35 U.S.C. 103 over Van Den Broek et al. in view of either Clouser, Castonguay et al, or Lindblom et al.

VII. GROUPING OF CLAIMS

The pending claims do not stand or fall together. The claims are divided into three groups for decision as independent groups.

Group I: Claims 1-5 and 21-23, pertaining to an electrically resistive composite material.
Group II: Claims 6-10 and 24-29, pertaining to a multi-layer foil.
Group III: Claim 11, pertaining to a multi-layer foil comprising a copper metal layer having a shiny surface, and an electrically resistive composite material layer associated with the copper metal layer shiny surface wherein the electrically resistive composite material layer includes from about 0.01 to about 99.9 area % of a conductive metal other

than copper and from about 0.01 to about 99.9 area % of particles of alumina; which multi-layer foil is formed by codepositing the electrically non-conductive particulate material and the electrically conductive material onto the copper metal layer by electrodeposition.

The claims from Group I do not stand with the claims from either of claim Groups II or III because the claims from Group I pertain to an electrically resistive composite material, **not a multi-layer foil.**

The claims from Group II are different from the claims of Group III because the two groups pertain to multi-layered foils having a different construction. The Group II claims pertain to a multi-layer foil comprising a conductive metal layer and a layer of the electrically resistive composite material of the invention. The Group III claims pertain to a multi-layer foil comprising a copper metal layer having a shiny surface, and an electrically resistive composite material layer associated with the copper metal layer shiny surface wherein the electrically resistive composite material layer includes from about 0.01 to about 99.9 area % of a conductive metal other than copper and from about 0.01 to about 99.9 area % of particles of alumina; which multi-layer foil is formed by codepositing the electrically non-conductive particulate material and the electrically conductive material onto the copper metal layer by electrodeposition.

Consequently, the claims present three individual groupings which do not stand or fall together.

VIII. ARGUMENTS

The examiner has rejected claims 1-11 and 21-29 under 35 U.S.C. 102 over Hunt et al. Appellants respectfully assert that this ground of rejection is incorrect and should be overruled. Hunt et al. fails to teach the structure of the presently claimed invention.

The present invention claims an electrically resistive composite material consisting essentially of an electrically conductive material selected from the group consisting of antimony, arsenic, bismuth, cobalt, tungsten, manganese, lead, zinc, palladium, phosphorus, sulfur, carbon, tantalum, aluminum, iron, titanium, platinum, tin, nickel, silver, copper and combinations thereof, and an electrically non-conductive particulate material selected from the group consisting of silicon carbide, alumina, platinum oxide, tantalum nitride, talc, polyethylene tetrafluoroethylene, and mixtures thereof evenly dispersed throughout the conductive material. According to the claims, the electrically resistive composite material is formed by codepositing the electrically non-conductive particulate material and the electrically conductive material onto a substrate by electrodeposition. Such is not taught by Hunt et al.

Indeed, Hunt et al. teaches a resistive material which may comprise a mixture of a conductive metal with a minor amount of a dielectric material. However, the material of Hunt et al. is formed by *chemical vapor deposition*, rather than codeposition via electrodeposition, which is a key feature of the present invention.

Appellants urge that a different structure is obtained by the electrodeposition by the present invention than with the chemical vapor deposition of Hunt. With CVD, the substrate is placed inside a reactor to which a number of gases are supplied. The fundamental principle of the process is that a chemical reaction takes place between the source gases. The product of that reaction is a solid material with condenses on all surfaces inside the reactor. One disadvantage associated with this CVD process is that it may result in the formation of different surface thicknesses across a target due to line-of sight effects where it can miss entire sections of the substrate.

In contrast, with electrodeposition, **metal ions** are deposited and the resulting surface is has a **crystalline** structure. When electrodepositing, a substrate is placed in an electrolytic liquid solution. An electrical potential is applied between a conducting area on the substrate, and a counter electrode in the liquid. A chemical redox process takes place

resulting in the formation of a layer of material on the substrate and usually some gas generation at the counter electrode. The electrodeposition process results in an even distribution in the bath. Thus, due to the vast differences between CVD and electrodeposition, it is clear that these processes would yield different structures.

The examiner has apparently taken the position that there is no difference in result when one conducts electrochemical deposition or chemical vapor deposition. This is not the case. Appellants have provided the Examiner with a passage from the McGraw-Hill Encyclopedia of Science and Technology, 1982, vol. 8, page 399, where it shows that vapor deposition of metals from coatings by condensation of metal vapor originating from molten metal. In contrast, the relevant passages from The Fundamentals of Electrochemistry and Electrodeposition, 1960, Franklin Publishing Company, shows that electrodeposition or plating is conducted by a chemical reaction, formation of metallic ions, and a deposition of a crystalline structure. It is submitted that this demonstrates that a different surface chemistry and topography is obtained by electrodeposition than by vapor deposition or sputtering. The examiner has required comparative evidence of the different structures obtained. It is submitted that additional evidence is not required. Applicants have supplied literature evidence showing the differences expected by one skilled in the art.

It is respectfully submitted that the Examiner has not given adequate weight to this important evidence. Appellants again stress that the crystalline structure formed through the electrodeposition process described above produces a different surface structure than a chemical vapor deposited surface structure. Applicants are not required to submit supplemental laboratory evidence until the examiner has produced a new *prima facie* case of obviousness. It is argued in this regard that the examiner has applied an incorrect standard of legal review. It is submitted that such a *prima facie* case has not been made in the first instance and applicant's rebuttal evidence has not been fully considered. In order to establish a valid rejection, the Examiner must consider all rebuttal evidence and form a new prima facie case. The Examiner has merely raised an argument as to why the

prior decision could be supported. Assuming for the moment that the initial rejection were *prima facie* sufficient, and such is not admitted, then upon the receipt of the new evidence, a re-analysis of all evidence of record should have been done to reach a conclusion based on a fair preponderance of the evidence. Instead, the prior conclusion was viewed as cast in stone and the new evidence evaluated with respect to its ability to completely destroy the previous position. This "knock out" power is not the proper standard for review, particularly since a *prima facie* conclusion only raises a burden of going forward with the evidence of the case and does not possess any life as evidence or fact itself. It is to be noted that the Examiner has provided no evidence in the record to support the continued maintenance of the rejection conclusion. When a *prima facie* case is established and evidence is submitted in rebuttal, the decision-maker must start over. An earlier decision should not, as it was here, be considered as set in concrete, and applicant's rebuttal evidence then be evaluated only on its knockdown ability. *Prima facie* obviousness is a legal conclusion, not a fact. Facts established by rebuttal evidence must be evaluated along with the facts on which the earlier conclusion was reached, not against the conclusion itself. *In re Rinehart*, 531 F. 2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

Appellants submit that Hunt et al.'s failure to teach an electrically resistive composite material which is formed by electrodeposition, as taught by the present invention, together with applicant's evidence of record which shows the differences in surface structures expected by one skilled in the art renders the invention patentably distinct from Hunt et al. It is therefore respectfully submitted that the 35 U.S.C. 102 rejection should be overruled.

The examiner has rejected claims 1-5, 21-23, and 27 under 35 U.S.C. 102 over Van Den Broek et al. Appellants respectfully submit that this ground of rejection is improper and should be overruled. Van Den Broek et al. fails to teach every aspect of the presently claimed invention. Van Den Broek et al. relates to a thin-film resistor and resistance material. Van Den Broek et al. fails to teach the electrically resistive composite material

which is *codeposited* by *electrodeposition.* Rather, this reference teaches a resistance material which is *mixed, heat pressed and sintered* onto a metal substrate. Clearly, this technique greatly differs from the electrodeposition process described above. Appellants urge that the process taught by Van Den Broek et al. results in the formation of a product having a different structure than that produced by Appellants. It is therefore submitted that Van Den Broek et al.'s failure to teach a product formed by electrodeposition renders the present invention patentably distinct from the cited reference. Thus, Appellants respectfully submit that the 35 U.S.C. 102 rejection in incorrect and should be overruled.

The examiner has rejected claims 6-11, 24-26, and 29 under 35 U.S.C. 103 over Van Den Broek et al. in view of either Clouser, Castonguay et al, or Lindblom et al. The examiner also makes an argument relating to abstract XP-002121182. The examiner asserts that it would have been obvious for one skilled in the art to combine these references to produce the presently claimed invention. Appellants respectfully urge that the Examiner is incorrect and should be overruled.

The arguments over Van Den Broek et al. are repeated from above and apply equally here. Van Den Broek et al teaches a resistance material which is *mixed, heat pressed and sintered* onto a metal substrate, and it fails to teach an electrically resistive composite material which is *codeposited* by *electrodeposition.* Appellants urge that these very different processes yield *different structures.*

The examiner has previously agreed that XP-002121182 fails to teach a foil conductive filler comprising copper, or a conductive metal layer or multilayer foil. Thus, the examiner cites Castonguay for teaching conductive metal foils. Clouser is cited for teaching conductive fillers made of nickel or copper. Also, Lindblom is cited for teaching the use of Invar having nickel. According to the examiner, it would be obvious for one skilled in the art to formulate the presently claimed invention upon a combined reading of Van Den Broek et al. with any of these references. Appellants urge that this position is unfounded. It is submitted that there is no teaching or suggestion in any of

these references that would lead one to combine such references in an effort to devise the present invention. None of these references teach the electrically resistive composite material as taught by the present invention, which is *codeposited* via *electrodeposition.*

Clouser employs electrodeposition, but his non-metallic material is not particulate. Clouser employs a *solution* containing *ionizable* acids and salts of nitrogen, phosphorus or sulfur containing compounds. (see col. 10, lines 25-68). The Clouser materials are not selected from the group consisting of silicon carbide, alumina, platinum oxide, tantalum nitride, talc, polyethylene tetrafluoroethylene, and mixtures thereof as required by these claims. Likewise, Castonguay, et al employs electrodeposition, but his non-metallic material is not particulate. Castonguay, et al deposit a solution of nickel, phosphorus and an oxide, hydroxide or peroxide of nickel. No particles are mentioned. Also, the Castonguay, et al materials are not selected from the group consisting of silicon carbide, alumina, platinum oxide, tantalum nitride, talc, polyethylene tetrafluoroethylene, and mixtures thereof as required by these claims. Lindblom, et al employs a *sputtering* process rather than *electrodeposition.* With regard to XP-002121182, boron nitride does not form a part of these claims. Thus, Appellants respectfully submit that one skilled in the art would not be inspired to combined the cited references in an effort to devise the present invention.

Appellants submit that the Examiner is looking beyond the teachings of the references. The Examiner appears to be going to great lengths to locate and try to interrelate references involving multilayered film structures having a conductive metal component and a non-conductive material component, but no matter how one applies or combines these references they do not teach the claimed structures to attain the demonstrated benefits. It is respectfully submitted that the examiner is reconstructing the art in light of Appellant's disclosure. An invention cannot be deemed unpatentable merely because, in a hindsight attempt to reconstruct the invention, one can find elements of it in the art. It must be shown that the invention as a whole was obvious at the time the invention was made without knowledge of the claimed invention. Further, when a selective

combination of prior art references is needed to make an invention seem obvious, there must be something in the art to suggest that particular combination other than hindsight gleaned from the invention itself, something to suggest the desirability of the combination. Such a suggestion is absent in the cited references.

For the reasons stated above, it is submitted that a combining of Van Den Broek et al. with any or all of these cited references would *still* fail to obviate the present claims. Appellants therefore urge that the 35 U.S.C. 103 rejection is improper and should be overruled.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage pre-paid in an envelope addressed to Assistant Commissioner for Patents and Trademarks, Washington, D.C. 20231, on October 7, 2002.

Richard S. Roberts

IX. APPENDIX

1. An electrically resistive composite material consisting essentially of an electrically conductive material selected from the group consisting of antimony, arsenic, bismuth, cobalt, tungsten, manganese, lead, zinc, palladium, phosphorus, sulfur, carbon, tantalum, aluminum, iron, titanium, platinum, tin, nickel, silver, copper and combinations thereof, and an electrically non-conductive particulate material selected from the group consisting of silicon carbide, alumina, platinum oxide, tantalum nitride, talc, polyethylene tetrafluoroethylene, and mixtures thereof evenly dispersed throughout the conductive material; which electrically resistive composite material is formed by codepositing the electrically non-conductive particulate material and the electrically conductive material onto a substrate by electrodeposition.

2. The electrically resistive composite material of claim 1 wherein the non-conductive material comprises alumina.

3. The electrically resistive composite material of claim 1 wherein the conductive material comprises copper.

4. The electrically resistive composite material of claim 1 wherein the conductive material comprises is not copper.

5. The electrically resistive composite material of claim 1 which has a resistivity of from about 1 to about 10,000 ohms/square.

6. A multi-layer foil comprising a conductive metal layer and a layer of the electrically resistive composite material of claim 1.

7. The multi-layer foil of claim 6 wherein the conductive metal layer and the conductive material are not the same material.

8. The multi-layer foil of claim 6 wherein the conductive material comprises copper.

9. The multi-layer foil of claim 6 wherein the conductive material comprises is not copper.

10. The multi-layer foil of claim 6 wherein the conductive material comprises nickel.

11. A multi-layer foil comprising a copper metal layer having a shiny surface, and an electrically resistive composite material layer associated with the copper metal layer shiny surface wherein the electrically resistive composite material layer includes from about 0.01 to about 99.9 area % of a conductive metal other than copper and from about 0.01 to about 99.9 area % of particles of alumina; which multi-layer foil is formed by codepositing the electrically non-conductive particulate material and the electrically conductive material onto the copper metal layer by electrodeposition.

21. The electrically resistive composite material of claim 1 wherein the conductive material comprises nickel.

22. The electrically resistive composite material of claim 1 wherein the amount of non-conductive material in the electrically resistive composite material ranges from about 0.01 to about 99.9 area %.

23. The electrically resistive composite material of claim 1 wherein the amount of conductive material in the electrically resistive composite material ranges from about 0.01 to about 99.9 area %.

24. The multi-layer foil of claim 6 wherein the conductive metal layer comprises copper.

25. The multi-layer foil of claim 6 wherein the conductive metal layer comprises copper and the conductive material does not comprise copper.

26. The multi-layer foil of claim 6 wherein the conductive metal layer comprises copper and the conductive material comprises nickel.

27. The multi-layer foil of claim 6 wherein the electrically resistive composite material has a resistivity of from about 1 to about 10,000 ohms/square.

28. The multi-layer foil of claim 6 wherein the non-conductive comprises alumina.

29. The multi-layer foil of claim 6 wherein the conductive metal layer comprises copper, the conductive material comprises nickel, and the non-conductive comprises alumina.